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**Directorate of
Intelligence**

Taiwan's Modest Defense Industries Program

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A Research Paper

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February 1985*

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A Research Paper

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This paper was prepared by [Redacted]
[Redacted] Office of East Asian Analysis.

Comments and queries are welcome and may be
directed to the Chief, China Division, OEA, [Redacted]

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**Taiwan's Modest Defense
Industries Program**

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Summary

*Information available
as of 1 February 1985
was used in this report.*

Since the United States recognized China in 1979, Taiwan has sought to decrease its dependency on the United States as a source of arms by promoting its own defense industries and diversifying its military purchases. Although the Taiwan media have trumpeted the success of this policy to allay domestic concern over "overreliance" on the United States, our analysis indicates the results have been only modest.

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Taiwan has developed and produced a number of weapon systems, but all are heavily dependent on foreign—mainly US—technology and key components. Weapon systems now in the planning stage, such as Taiwan's next generation fighter aircraft, a surface-to-air missile, and a surface-to-surface cruise missile will be equally dependent on outside assistance

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To boost arms production substantially, the government would have to divert funds from its economic modernization program—something it is not prepared to do. Although the defense budget is the largest item in the national budget, it has declined in recent years because Taiwan's economic policy emphasizes education, research and development, and economic reconstruction projects. We believe that Taiwan will continue to proceed prudently, anxious to avoid the high economic costs that a full-scale arms program would entail.

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Taiwan's effort to diversify military purchases has largely failed. Most nations interested in selling to Taiwan are constrained by their fear of economic and political retaliation from Beijing.

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Thus, although we expect Taiwan eventually to develop increasing self-sufficiency in some areas—notably small naval combatants and jet trainer aircraft—we do not believe such progress will reduce Taiwan's interest in acquiring US weaponry and weapons technology. Its leaders regard that connection as too critical politically for the island's long-term security.

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Taiwan: Major Defense Production Facilities



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Taiwan's Modest Defense Industries Program

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Development of the Defense Industries

Following US recognition of the government in Beijing in 1979 and the subsequent US promise to reduce the quantity and quality of the arms it sold to Taiwan, Taipei announced a drive to achieve self-sufficiency in weapons production. In the interim, the military leadership said it would diversify its arms purchases away from the United States

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To expedite production of a wide variety of weapons and equipment, Taipei in 1979 established eight research and development groups.¹ Made up of representatives from the armed services, the Chung-shan Institute of Science and Technology (CIST), and the Industrial Development Bureau of the Ministry of Economic Affairs, the groups were directed to establish long- and short-range production goals and monitor weapons development programs. At the same time, Taipei began increasing its national defense budget until it peaked at \$3.6 billion in 1983 or 42 percent of the total budget

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In 1982 Taiwan for the first time encouraged cooperation between the civilian technical and scientific community and the military community to strengthen its capabilities to develop and produce sophisticated military equipment. The joint efforts concentrate on electronics, computers, material sciences, and information processing. Civilian research centers, such as the Hsin-chu Science and Industry Park, the Institute of Information Industry, and the Industrial Technology Research Institute, provide technical expertise to the defense industries.

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Taiwan also funds private companies and civilian research centers to acquire from foreign firms components and technology that are suitable for the manufacture of military hardware. In addition, Taipei has announced that the military will help colleges and universities set up research centers to promote defense technolog

¹ Each of the research and development groups addresses a particular category of weapons and equipment: tanks and armored vehicles; warships; aircraft; light weapons, artillery, and ammunition; rockets and missiles; radar, communications equipment, and electronic instruments; components and spare parts; and raw materials

Control of the Defense Industry

The Ministry of National Defense controls the defense industries through several subordinate organizations and government-owned facilities:

- *The Chung-shan Institute of Science and Technology is responsible for the research and development of modern weapons. The institute consists of five departments: nuclear, aerospace (the Aero Industry Development Center), missile, chemical, and electronics.*
- *Shipyards at Kao-hsiung, Chi-lung, Tso-ying, and Ma-kung are responsible for Taiwan's naval shipbuilding activities. The Kao-hsiung shipyard is one of the largest, most modern shipyards in the world and the second largest in Asia.*
- *The Combined Services Force, which is on the same command level as the three armed services, operates several arsenals that produce a variety of weapons, ammunition, vehicles, and communications equipment*

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Producing Weapons—But With Foreign Assistance

The Taiwan military believes its most critical needs are the air and naval weapons that would be essential to achieving air superiority over the Taiwan Strait or countering a naval blockade in any conflict with China. Thus Taiwan's highest priority for its defense industries has been the development of a high-performance jet fighter. Other high priorities have included developing long-range standoff missile systems for its naval and land forces and building new warships

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Progress toward developing those weapon systems, however, has been slow. Since the late 1970s, Taiwan has produced antiship and antitank missile systems, missile attack boats, patrol ships, jet trainer aircraft, multiple rocket launchers, and large-caliber artillery.

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Taiwan's Defense Budget, 1979-85*Billion US \$*

| | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 |
|------------------------------------|------------|------------|------------|------------|------------|------------------|------------------|
| Total | 1.7 | 1.8 | 2.5 | 3.5 | 3.6 | 3.2 | 3.4 |
| Share of national budget (percent) | 39.1 | 34.0 | 35.0 | 41.6 | 42.1 | 40.9 | 37.8 |
| Share of GDP (percent) | 5.3 | 4.5 | 5.6 | 7.6 | 7.3 | 5.9 ^a | 5.8 ^a |

^a Estimated.

[redacted]

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In addition, Taiwan is working on other weapon systems that could enter production in the late 1980s, including a surface-to-air missile and a surface-to-surface cruise missile. But the development or production of the more advanced systems has been delayed because of serious technical problems. Moreover, despite the establishment of the indigenous research groups, all of these weapon systems remain heavily dependent on foreign—mainly US—technology and key components. And weapon systems now in the planning stage will be equally dependent on outside assistance [redacted]

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and ammunition worth several million dollars [redacted] [redacted] several other countries [redacted]

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[redacted] are interested in buying arms from Taiwan, but so far no major agreements have been signed [redacted]

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We believe several factors prevent Taiwan from gaining a larger share of the lucrative international arms market:

- Taiwan lacks the technology to compete with items from more advanced countries.

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- Taiwan is vulnerable to political and economic pressure from a few countries. For example, Saudi Arabia, Taiwan's major oil supplier, pressed Taiwan on Iraq's behalf to stop selling arms and equipment to Iran.

- Some military equipment is of US design, and resale to other countries is restricted [redacted]

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Nonetheless, some growth in Taiwan's share of the international arms market is likely. Programs to produce more modern weapons such as antiship missiles, trainer aircraft, self-propelled guns, and missile boats will increase Taiwan's image as a source of weapons, especially among Third World nations. Taipei probably will concentrate on the market shared by arms suppliers to the Third World such as Brazil, South Korea, and the East European countries [redacted]

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Limited Procurement of Foreign Arms

Similarly, Taiwan's search for alternate sources of arms since 1979 has achieved only limited success. Because most nations remain wary of Chinese retaliation, Taiwan has only been able to make one-time purchases of finished products or technology and has not acquired such items as sophisticated fighter aircraft that require long-term support in spare parts:

- Taipei signed a \$138 million arms deal in 1979 with Switzerland for 35-mm Oerlikon antiaircraft artillery (AAA) guns and the Skyguard fire-control system. [redacted] In 1982 Taiwan also bought a \$70-million maintenance facility for the guns. Last year, however, the Swiss Government, citing legal grounds, rejected requests from Swiss firms to sell trainer aircraft and armored vehicles to Taiwan.
- Taiwan purchased Bofors 40-mm AAA guns from Sweden for \$36 million in 1979 to improve the Navy's air defense capability. Taiwan used Singapore as an intermediary, because Sweden would not sell the weapons directly to Taiwan.
- Taiwan also used Singapore as an intermediary for the purchase of 76-mm AAA guns and ammunition from Italy in 1979. [redacted] More recently, Rome approved negotiations with Taipei for the sale of antisubmarine warfare helicopters and trainer aircraft, but it insisted that any sale be made through an intermediary to prevent reaction from Beijing.
- In 1980 the Netherlands agreed to build two diesel-powered submarines for Taiwan, and the Chinese recalled their Ambassador to the Netherlands and reduced diplomatic relations to the charge d'affaires level in protest. As a result, the Dutch in 1983 refused to build additional submarines for Taiwan because they feared that China would break relations.
- West Germany in 1983 agreed to sell through the United States 66 used F-104s to Taiwan. Although the sale drew only a pro forma protest from China, West Germany last year rejected Taiwan's request for 43 additional F-104s. [redacted]

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Barriers to Self-Sufficiency

Even if Taipei were able to assure a steady supply of equipment and technology from non-US sources, it would still be a long way from self-sufficiency in arms production. US observers report that Taiwan is not capable of fully absorbing and exploiting technology transfers and key components in major development projects because there is no corps of scientists and engineers trained in system integration. The resulting trial-and-error method and interim fixes waste valuable resources and frustrate military leaders. For example, naval officials complain about the continuous problems with the Hsiung Feng antiship missile system, which has already undergone years of testing. [redacted]

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We believe that several other factors prevent Taiwan from achieving a major degree of self-sufficiency in arms production:

- Taiwan long ignored the scientific technologies and skills needed for the research and development of modern weapons because it relied on the United States to arm its military forces.
- The number of engineers and technicians skilled in the design, research, and development of sophisticated weapon systems is limited. Private and government industry face stiff competition from foreign firms that offer more attractive employment opportunities for Taiwan's pool of scientific and technical talent.
- The island's defense industries are almost totally dependent on imports of raw materials from the United States and other countries. The inconsistency of raw material supplies has caused factories to operate far below full capacity.
- Taiwan's commercial industry lacks the means to produce sufficient quantities of machinery required for large-scale arms production. Despite government incentives, some commercial companies are reluctant to commit large amounts of capital until they have gained experience in producing weapons for the government or foreign markets. [redacted]

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Implications for the United States

We believe Taipei's leaders will continue to seek access to US logistic and weapon systems indefinitely for both economic and political reasons. The costs of developing the capability to produce all of its own weapons, or of switching to other suppliers for major weapon systems—even if other suppliers could be found—would be almost prohibitive. Moreover, it would require Taipei to divert funds from its economic modernization program—something it is not prepared to do. In fact, after an initial sharp increase in the defense budget after derecognition, planned defense spending since 1982 has been declining sharply as a percentage of GDP and [redacted] share of the national budget [redacted]

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At best, it will take Taiwan 10 to 15 years to become self-sufficient in some key weapon systems, design technology, and military components. Meanwhile, it will have to seek foreign help—primarily from the United States—for the technology and designs for such sophisticated weapons as new fighters and missile systems and for equipment essential to maintaining the island's crucial air and naval defenses and sustaining military moral [redacted]

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In addition to the fiscal and technological limitations, Taipei—in our view—is unwilling to develop an indigenous weapons production capability because it values acquisition of US arms as tangible displays of US political support. Since January 1979, when the United States broke diplomatic relations with Taipei and abrogated the mutual defense treaty, senior Taiwan leaders have also highlighted the sales domestically to demonstrate their ability to maintain the US link, which most on the island view as crucial to Taiwan's security. This is particularly true when the sales occur against the backdrop of protests from Beijing [redacted]

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During 1980-81, Taipei used news of such sales—sometimes falsified—to try to disrupt US-Chinese relations. Although this practice has not been employed recently, US arms sales will probably remain the key irritant in these relations for the foreseeable future [redacted]

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Appendix A

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Taiwan's Missile Industry

Taiwan began to develop a modest missile industry in the mid-1970s, soon after purchasing Gabriel *surface-to-surface antiship missiles* from Israel. Taiwan initially equipped a few ships with Gabriels, but Israel's price increases led Taipei to develop and produce its own version of the missile, called the Hsiung Feng (Drone Bee). The Hsiung Feng can be launched from ship or shore and has a range of about 36 kilometers (km) and a high-explosive warhead of 70 kilograms.

[redacted]
[redacted] serious early problems with the Hsiung Feng fire-control and radar system have been solved, and Taiwan will start producing the missile this year. The Hsiung Feng will initially be deployed on Taiwan's destroyers and missile attack boats [redacted]

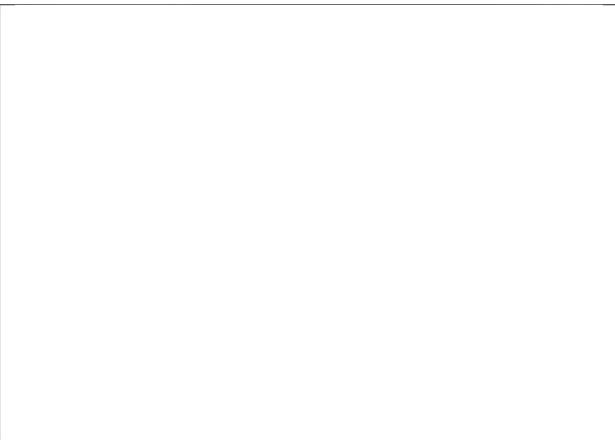
In the late 1970s, Taiwan developed a *short-range ballistic missile*, designated the Ching Feng, as a pilot project to gain the skills and techniques necessary for the development of a longer range missile. The Ching Feng was a single-stage missile designed to carry a 450-kilogram warhead a distance of 110 km. The short range of the missile, however, limited its land-based deployment to the offshore islands of Quemoy and Ma-tsu. Taiwan displayed the missile publicly in 1981, but canceled production the next year because of continuing problems with the solid-propellant and the guidance system. [redacted]

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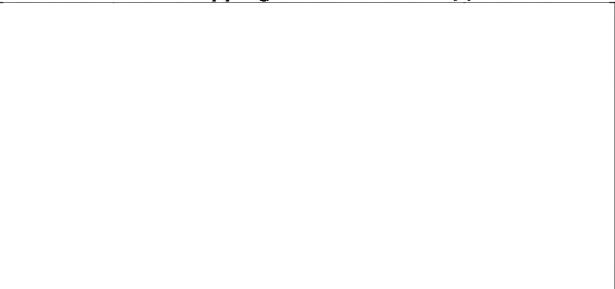
The Chung-shan Institute of Science and Technology (CIST) started working in 1981 on the follow-on multistage version of the Ching Feng that would be capable of striking coastal airfields and embarkation points in China. Press reports indicate that the missile will have a range of 960 km, but [redacted]

[redacted] the range is closer to 700 km [redacted]

We believe, however, that the new missile probably will not be successfully developed during this decade without substantial foreign assistance [redacted]



Taiwan is converting the US Beech Model 1089 [redacted] 25X1 target drone to use as a *surface-to-surface cruise missile* for antishipping and antiradar applications.



The cruise missile reportedly will replace the land and ship-based Gabriel and Hsiung Feng antiship missiles [redacted] 25X1 because it has longer range and better accuracy. The missile has been successfully tested, a [redacted]

[redacted] but Taiwan made wing modifications in 1982 to reduce the missile's radar cross section and increase the missile's speed [redacted] 25X1 [redacted] 25X1
[redacted] flight tests con- 25X1
tinue at a missile test range, and we believe the missile could be deployed in two or three years [redacted]

[redacted] Taiwan is developing a medium altitude *surface-to-air missile* (SAM) to fulfill its air defense needs in the 1990s. The two-stage missile, which is called the Tien-Kung, was [redacted] 25X1

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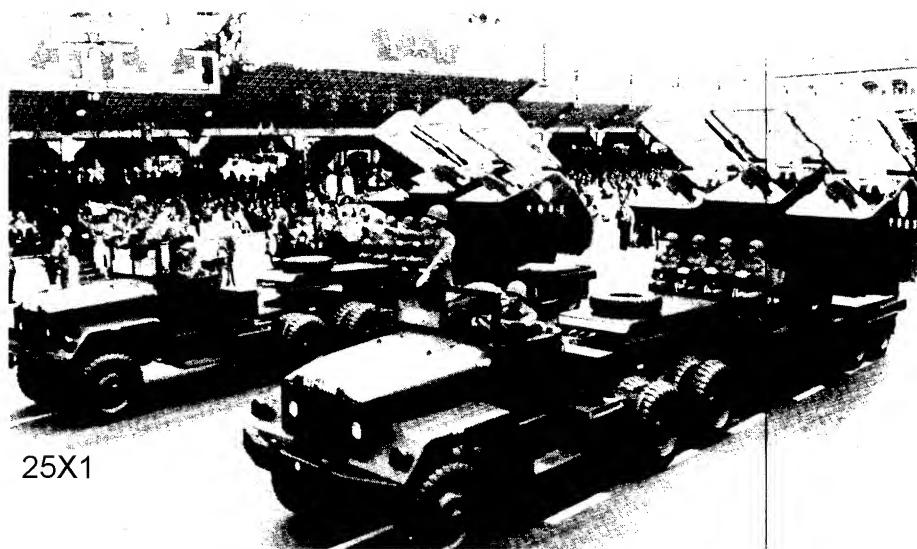
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Hsiung Feng antiship missiles

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successfully launched during its last four tests, but CIST expects development to continue for at least four more years

Taiwan is producing small numbers of an *antitank guided missile* based on the Soviet Sagger, which Taiwan obtained from South Vietnam during the 1970s. The Taiwan Army is mounting the missile system on jeeps and armored personnel carriers. We believe that Taiwan is only producing small numbers of the missiles because it has a low priority and dated design.

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Appendix B

Taiwan's Aircraft Industry

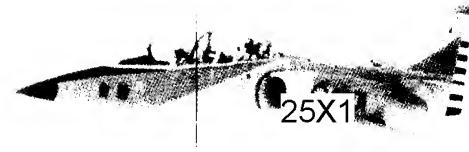
The programs to coproduce US jet fighters and helicopters during the 1970s broadened the technological base of Taiwan's aircraft industry and provided the Aero Industry Development Center (AIDC) with the experience required to design and build aircraft. AIDC has a research lab, a manufacturing facility, and an engine plant, but it still lacks the technology and manufacturing capacity to produce advanced jet engines and avionics for jet fighters. Since 1979, AIDC has:

- Accelerated development of Taiwan's jet trainer and jet fighter aircraft.
- Constructed a high-velocity wind tunnel for aircraft research and development.
- Constructed a defense plant for the manufacture of electronic components used in avionics.
- Provided technical assistance to private industry in the manufacture of aircraft components

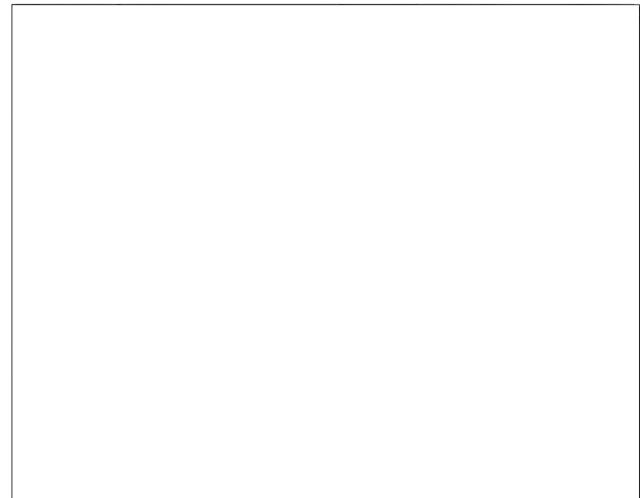
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A domestically developed jet trainer, the *AT-3*, was unveiled last year, but it is not in series production. We believe that Taiwan is making modifications to the aircraft, because only five aircraft have been built and they have not been deployed. The twin-seat aircraft is powered by two Garrett turbofan engines and is designed to replace Taiwan's aging US-built trainers. The *AT-3* can be used in a combat role because it is capable of carrying an assortment of missiles, bombs, rockets, and gun pods. Taiwan reportedly plans to build at least 60 of the aircraft and hopes eventually to export it to Southeast Asian and Latin American countries

Taiwan is developing a new jet fighter, designated *XF-6*, to replace its F-5E fighters.



AT-3 jet trainer



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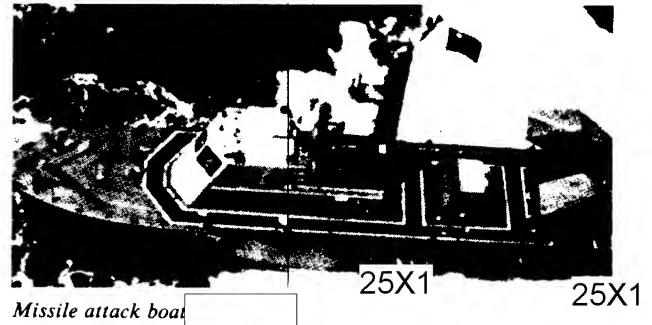
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Appendix C

Taiwan's Naval
Shipbuilding Industry

Taiwan has the modern equipment and skilled personnel to build warships, as long as foreign design technology and technical assistance are available. Taiwan started constructing large naval ships in the mid-1970s by concluding a contract with a US firm, Tacoma Boat-Building Company, to coproduce two *multimission patrol ships* (PSMM). The all-aluminum PSMM has a full load displacement of 260 metric tons, a maximum speed of 40 knots, and is powered by a mix of diesel and gas-turbine engines.



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Tacoma built the first PSMM in the United States and delivered it—without weapon systems—to Taiwan in 1978. Taiwan completed construction of the second ship in 1981 with materials and technical assistance provided by Tacoma. The Taiwan Navy equipped the ships with four Israeli Gabriel-II antiship missiles, a Swedish 40-mm AAA gun, and a sophisticated sensor system for surface and antiaircraft warfare.

- Taiwan signed a contract in 1982 with the British-owned, Singapore-based firm of Vosper for the construction of 27 100-ft *patrol boats*, [redacted]

[redacted] Twenty-five of the boats are being built under license in Taiwan and will be armed with 40-mm guns. Taiwan probably will use the patrol boats for coastal defense and fisheries enforcement.

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After the United States severed relations with Taiwan, military leaders outlined plans to design and produce in Taiwan a second generation of naval ships to replace its aging fleet.

- Taiwan has designed a 1,200-ton *corvette* powered by indigenously made diesel engines, according to [redacted] press reports. The corvette will carry antiship missiles, AAA guns, and a helicopter equipped for antisubmarine warfare. Taiwan reportedly plans to launch the first ship by 1987.

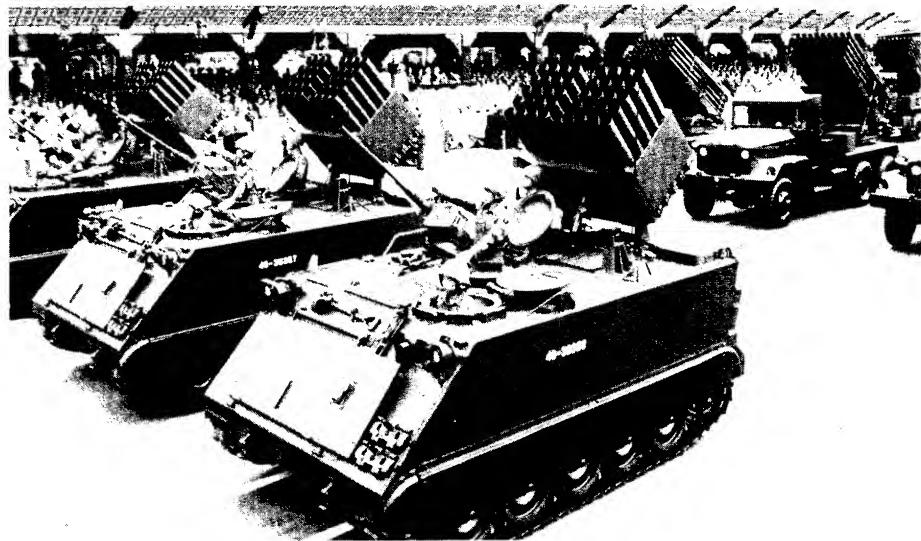
- [redacted] Taiwan has indigenously designed and produced at least two *transport ships* since 1981. The ships have no weapon system, but platforms are mounted on board to carry AAA weapons. The ships will improve the Navy's capability to resupply and reinforce the offshore islands during hostilities.

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Kung Feng 4 (front) and Kung Feng 6 (rear)

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Appendix D

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Taiwan's Ground
Armaments Industry

Taiwan has developed and produced armored vehicles, artillery pieces, multiple rocket launchers, mortars, and rifles, although these items are based on foreign weapon systems or use foreign components. In addition, Taiwan produces under licensing arrangements, a variety of small arms, ammunition, and military vehicles that are copies of older, US-designed systems.

Taiwan also has produced several other weapon systems for the ground forces using technical assistance and key components from other countries, including:

- An extended range *self-propelled (SP) 155-mm gun* 25X1 that is based on a South African-made artillery piece [redacted]. The gun reportedly has a range of 45 km. Taiwan purchased gun barrels and forging equipment for the gun [redacted] and it developed extended range ammunition for the gun 25X1. Technical assistance from [redacted]

- A short-barreled *SP 155-mm howitzer* that mounts a domestically produced version of a US howitzer 25X1 on a modified US tracked chassis.

- A *155-mm towed howitzer*, which Taiwan unveiled in 1981, that appears to be a copy of the Israeli Soltham M-68 155-mm howitzer. After solving technical problems with the gun's barrel, Taiwan started deploying the weapon last year.

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Press reports in 1981 indicated that Taiwan indigenously developed a new *light tank* called the M-64. The new tank, however, apparently is a modification of the US M-41 light tank already in Taiwan's inventory. According to [redacted] the press, Taiwan added a layer of extra-hard alloy steel armor plate to the tank for improved armor protection and installed a diesel engine and a new transmission obtained from the United States. Taiwan reportedly has equipped the tank with indigenously produced systems including a 76-mm main gun, an infrared night vision system, a laser rangefinder, and an electronic communications system [redacted]

- The Kung Feng 4, which is a 40-tube *126-mm multiple rocket launcher* that can be towed or mounted on a US M-113 APC. Taiwan began producing the weapon system in 1981 with key components from the United States. A 16-tube version of the system is being installed on Taiwan's destroyers.

Taiwan has developed and produced an *armored infantry fighting vehicle* (AIFV), which is similar to the US M-113 armored personnel carrier. The AIFV reportedly has an added layer of steel armor, an amphibious capability, and is protected against chemical and biological agents. According to press reports, the AIFV is powered by a British-designed diesel engine coupled to a transmission system developed by Taiwan. The vehicles will supplement the M-113s already in the inventory [redacted]

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- The Kung Feng 6, a 45-tube *117-mm multiple rocket launcher* made with US components that can be mounted on a truck or a tank chassis. According to press reports, it has an impact area of 30,000 square meters [redacted]

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